

# PATENT SPECIFICATION



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## COMPLETE SPECIFICATION



### Improvements in or relating to Light Reflectors

I, GUSTAVE LERAY, a citizen of the French Republic, of 5, rue Dulaure, Paris, France, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention concerns auto-collimating reflectors and relates more particularly to devices in which there are employed three reflecting mirrors or surfaces disposed in such a manner as to form a trirectangular trihedron, i.e. a trihedron in which all the faces are at right angles to one another.

It is known that auto-collimating light reflectors may be formed by means of a refractive medium limited by a trirectangular trihedron.

Such a device only possesses a satisfactory luminous efficiency when the incident ray has a direction approximating to that of the axis of the reflecting trihedron. In fact, if one goes too far from the direction of this axis there is no longer total reflection on the faces of the trihedron, and luminous efficiency then becomes very defective. Also, in all the devices at present known the reflecting trihedra which constitute the elements of a reflecting device are solid or integral with a transparent base plate, and the device is arranged or mounted in such manner that the axis of the reflecting trihedron is sensibly perpendicular to the said base surface; thus these known reflectors only partially reflect, black spots or non-reflecting spots being present, and the devices are auto-collimators for incident rays, the direction of which is sensibly perpendicular to the base surface.

However, it sometimes occurs in practice that the conditions under which the reflecting device is employed are such that the device has to function as an auto-collimator for a ray, the direction of which is not perpendicular to the base surface. This case arises notably if the reflecting device is required to be fixed to the rear wing or mud guard of an automobile. With the devices at present known the luminous efficiency in such cases is bad.

[Price 1/-]

The present invention has for its object to remedy this defect, and the invention provides a method of constructing an auto-collimating reflector having a high and useful efficiency when the incident ray makes a fixed and known angle with the said device.

The invention also concerns the industrial products which are obtained in accordance with the method referred to above.

According to one aspect of this invention, there is provided an auto-collimating light reflecting device comprising one or more light reflecting elements each constituted by a trirectangular trihedron the axis of which is inclined in relation to the plane of the base thereof.

The trihedra which constitute the various elements of a reflecting device according to this invention may be juxtaposed in any suitable manner, and in particular, it is possible to adopt the method of assembly which is described in my prior British Patent No. 423,464.

In order that the invention may be clearly understood and more readily carried into practice, reference will now be made to the sheet of drawings appended hereto, in which:—

Figure 1 is an elevation and a plan view of a trihedral element which is met with in the usual reflecting devices, the axis of the trihedron being perpendicular to the base surface,

Figures 2 and 3 show similar views of trihedra, the axis of each of which has been inclined in relation to the base surface in accordance with the present invention, and

Figures 4 and 5 show in section and plan respectively a particular method of assembling trihedral elements in accordance with the present invention.

The elementary trihedron shown in Figure 1 comprises an apex S and three edges SA, SB, SC; the trihedron is cut by a plane P perpendicular to the axis SH of the trihedron. Consequently, any incident ray perpendicular to the plane P, that is to say, parallel to SH returns on to itself after reflection on the faces of the trihedron, the device thus having

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a high luminous efficiency for a ray perpendicular to the plane P.

In Figure 2, which shows one of the possible constructions of an element in accordance with the present invention, the angle which the axis SH of the trihedron makes with the base plane P is other than a right angle. The axis is in the plane containing SA and perpendicular to BC, and it is inclined in relation to the base in the same sense as the edge SA. The magnitude of the angle of inclination of the axis is calculated in such manner that the incident ray in a direction IH is parallel to the axis SH of the trihedron after refraction at the base plane P.

Figure 3 shows a similar arrangement to that according to Figure 2, but in this case, the axis of the trihedron and the edge SA are inclined to the base plane in opposed senses.

It is evident that the inclination of the axis of the trihedron in respect to the base plane P may occur in any azimuth whatever. Only considerations of assembly or mounting or the purpose for which the device is to be used will determine where the azimuth in which the axis is to be inclined will be fixed.

In Figures 4 and 5, there is shown one possible assemblage of the various trihedral elements, which enables reflecting surface without discontinuity to be obtained.

In accordance with this method of carrying out the invention the axes of the elementary trihedra are parallel to one another, and the faces are cut by planes as indicated in the above mentioned Patent.

A piece of glass for instance may be moulded, ground or otherwise worked so as to form on its surface a plurality of trirectangular trihedral projections, the axes of which are inclined relatively to the surface of the glass.

By way of example, the case may be mentioned where the device is to be fixed to a rear wing of a vehicle in order to indicate the presence of the vehicle to any observer advancing from the rear and provided with head lights or lamps which give a horizontal beam. The angle which the incident ray makes with the base plane of the auto-collimator will be, for example, in this case  $42^\circ$ ; if the index of the glass of which the device is made is  $n=1.517$  it is easy to determine by calculation the angle which the axis of the trihedron must make with the base plane. It is found that this angle has a value approximating to  $61^\circ$ .

It is obvious that the reflecting device may be made of any suitable material

coloured or uncoloured. Moreover, the trihedra which constitute the elements of the device may be fixed to the base plate in any suitable manner, or the assembly or unit may even be obtained by moulding a suitable plastic material.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. An auto-collimating light reflecting device comprising one or more light reflecting elements each constituted by a trirectangular trihedron the axis of which is inclined in relation to the plane of the base thereof.

2. An auto-collimating light reflecting device according to claim 1 wherein the angle which the axis of the trihedron, or each trihedron, makes with the plane of the base thereof is such that all light rays having a predetermined angle of incidence, after refraction at the plane of the base, travel along or parallel to said axis.

3. An auto-collimating light reflecting device having one or more light reflecting elements constituted, or each constituted, by a trirectangular trihedron having its open face mounted on, or integrally associated with a base of transparent refractive material, the device being so constructed or arranged that the said base lies in a plane which is not perpendicular to the axis of the said trihedron.

4. An auto-collimating light reflecting device according to any of the preceding claims, comprising a plurality of the trihedral elements disposed with their axes parallel to one another.

5. An auto-collimating light reflector comprising a member composed of refractive material having a surface formed with a plurality of trihedral projections, the axis of each of said trihedra being obliquely inclined in relation to said refractive member in such manner that rays of light striking said refractive member with a predetermined angle of incidence are propagated substantially along or parallel to the axes of said trihedra.

6. An auto-collimating light reflector comprising a member composed of refractive material and having a surface on which is affixed a plurality of trihedral elements, the axis of each of which is obliquely inclined to said surface in such manner that rays of light striking said refractive member at a predetermined angle of incidence are propagated substantially along or parallel to the axes of said trihedral elements.

7. An auto-collimating light reflector according to claim 5, wherein said refractive member is composed of glass and is formed by moulding, grinding or the like.

8. An auto-collimating light reflector according to claim 5, wherein said refractive member is composed of a suitable plastic material which is moulded to the required shape.

9. A light reflector or a light reflecting element or member according to any of the preceding claims, composed of coloured material.

10. An auto-collimating light reflector substantially as described.

11. A light reflecting element substantially as described.

Dated this 21st day of December, 1934.

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[This Drawing is a reproduction of the Original on a reduced scale.]

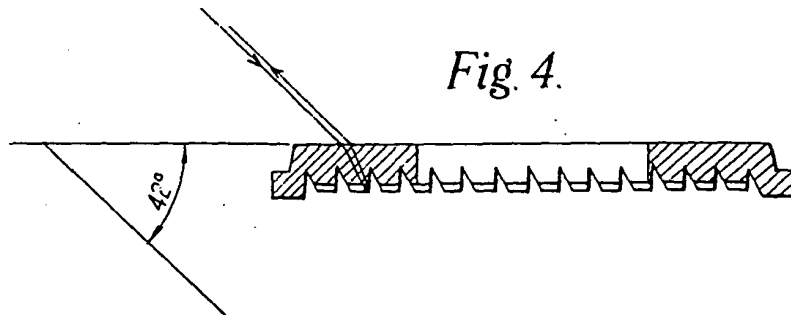
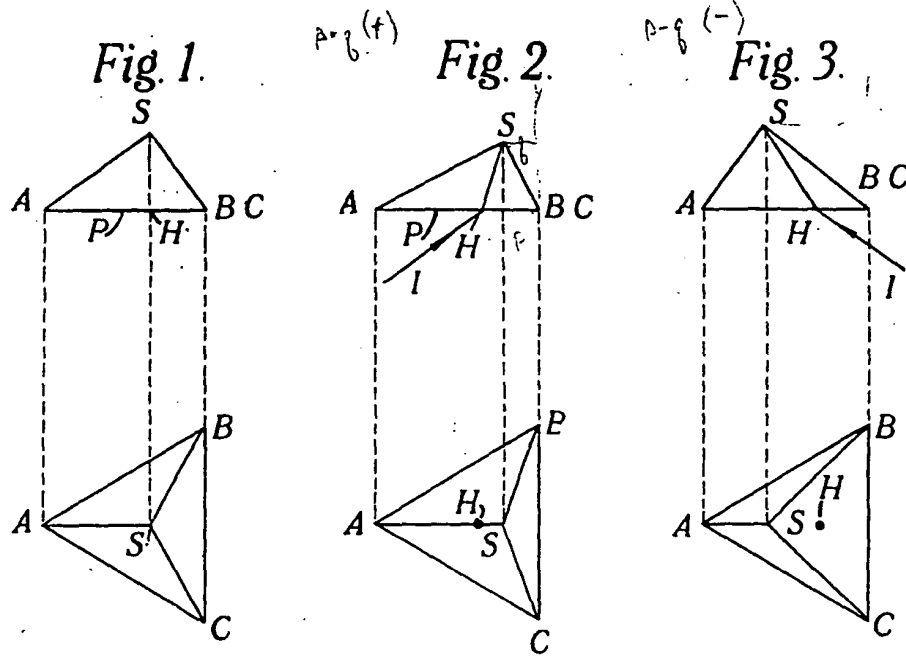
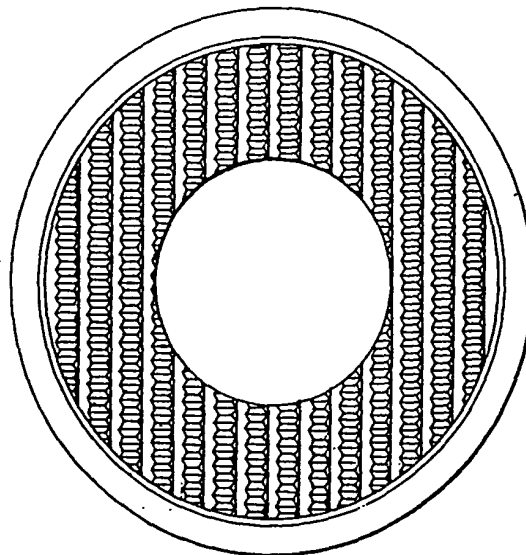
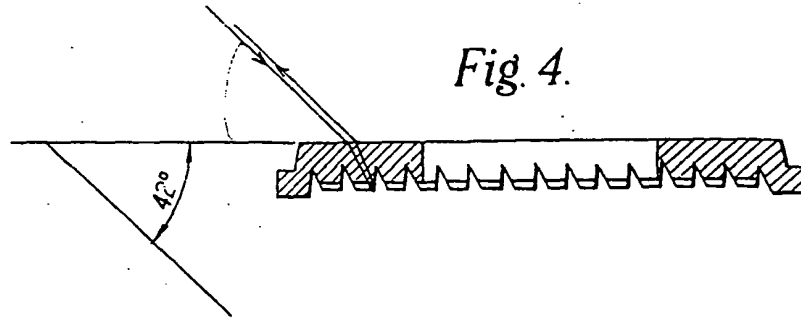
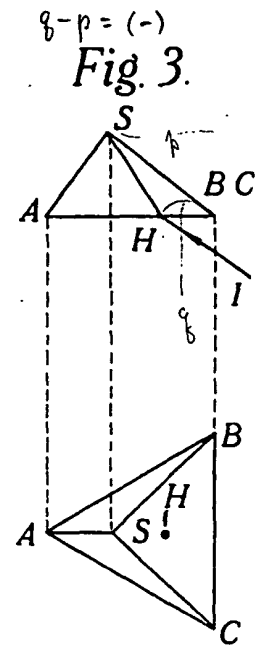
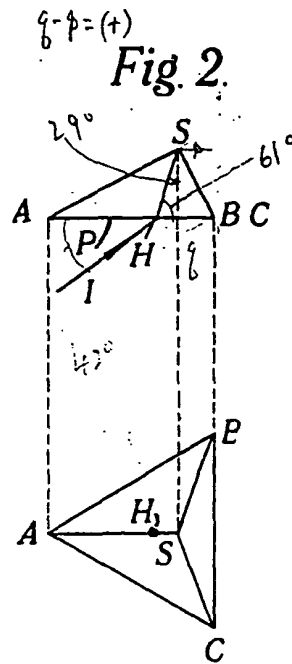
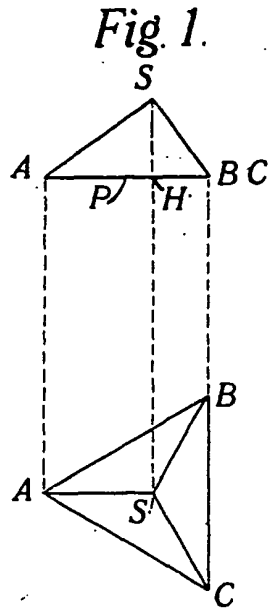


Fig. 5.



[This Drawing is a reproduction of the Original on a reduced scale.]



**Fig. 5.**

